

What is claimed is:

1. An osteogenic protein comprising an amino acid sequence selected from the group consisting of:

- (a) amino acids #32-#129 of Figure 1 (SEQ ID NO: 2);
- (b) amino acids #299-#396 of Figure 2 (SEQ ID NO: 4); and
- (c) amino acids #311-#408 of Figure 3 (SEQ ID NO: 6).

2. An osteogenic protein selected from the group consisting of:

- (a) a purified BMP-2 protein produced by the steps of
 - (i) culturing a cell transformed with
 - (a) a cDNA comprising the nucleotide sequence from nucleotide #356 to #1543 as shown in Figure 2 (SEQ ID NO: 3); and
 - (b) sequences which hybridize to sequence (a) under stringent conditions and encode a protein having cartilage and/or bone induction activity
 - (ii) recovering and purifying from said culture medium a protein comprising the 97 amino acid sequence from amino acid #299 to amino acid #396 as shown in Figure 2 (SEQ ID NO: 4); and
- (b) a purified BMP-4 protein produced by the steps of
 - (i) culturing a cell transformed with
 - (a) a cDNA comprising the nucleotide sequence from nucleotide #403 to #1626 as shown in Figure 3 (SEQ ID NO: 5); and
 - (b) sequences which hybridize to sequence (a) under stringent conditions and encode a protein having cartilage and/or bone induction activity;
 - (ii) recovering from said culture medium a protein comprising the 97 amino acid sequence from amino acid #311 to amino acid #408 as shown in Figure 3 (SEQ ID NO: 6).

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3. A BMP-2 protein comprising amino acids #283-#396 of Figure 2 (SEQ ID NO: 4).
4. The protein of claim 3 wherein said protein is a disulfide linked dimer wherein at least one of the subunits of said dimer comprises amino acid #283-#396 of Figure 2 (SEQ ID NO: 4).
5. A purified BMP-2 protein produced by the steps of
(a) culturing a cell transformed with a cDNA comprising the nucleotide sequence from nucleotide #356 to #1543 as shown in Figure 2 (SEQ ID NO: 3); and
(b) recovering and purifying from said culture medium a protein comprising the 97 amino acid sequence from amino acid #299 to amino acid #396 as shown in Figure 2 (SEQ ID NO: 4).
6. A BMP-4 protein comprising amino acids #293-#408 of Figure 3 (SEQ ID NO: 6).
7. The protein of claim 6 wherein said protein is a disulfide linked dimer wherein at least one of the subunits of said dimer comprises amino acid #293-#408 of Figure 3 (SEQ ID NO: 6).
8. A purified BMP-4 protein produced by the steps of
(a) culturing a cell transformed with a cDNA comprising the nucleotide sequence from nucleotide #403 to #1626 as shown in Figure 3 (SEQ ID NO: 5); and
(b) recovering from said culture medium a protein comprising the 97 amino acid sequence from amino acid #311 to amino acid #408 as shown in Figure 3 (SEQ ID NO: 6).
9. A protein of claim 1 further characterized by the ability to induce the formation of cartilage and/or bone.
10. A pharmaceutical composition comprising an effective

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amount of a BMP-2 protein in admixture with a pharmaceutically acceptable vehicle.

11. A pharmaceutical composition comprising an effective amount of a BMP-4 protein in admixture with a pharmaceutically acceptable vehicle.

12. A composition for bone and/or cartilage formation comprising an effective amount of a BMP-2 protein in a pharmaceutically acceptable vehicle.

13. A composition for bone and/or cartilage formation comprising an effective amount of a BMP-4 protein in a pharmaceutically acceptable vehicle.

14. A composition of claim 12 further comprising a matrix for supporting said composition and providing a surface for bone and/or cartilage growth.

15. A composition of claim 13 further comprising a matrix for supporting said composition and providing a surface for bone and/or cartilage growth.

16. The composition of claim 14 wherein said matrix comprises a material selected from the group consisting of hydroxyapatite, collagen, polylactic acid and tricalcium phosphate.

17. The composition of claim 15 wherein said matrix comprises a material selected from the group consisting of hydroxyapatite, collagen, polylactic acid and tricalcium phosphate.

18. A method for inducing bone and/or cartilage formation in a patient in need of same comprising administering to said

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patient an effective amount of the composition of claim 11.

19. A method for inducing bone and/or cartilage formation in a patient in need of same comprising administering to said patient an effective amount of the composition of claim 11.

20. A pharmaceutical composition for wound healing and tissue repair said composition comprising an effective amount of a BMP-2 protein in a pharmaceutically acceptable vehicle.

21. A pharmaceutical composition for wound healing and tissue repair said composition comprising an effective amount of a BMP-4 protein in a pharmaceutically acceptable vehicle.

22. A method for treating wounds and/or tissue repair in a patient in need of same comprising administering to said patient an effective amount of the composition of claim 21.

23. A method for treating wounds and/or tissue repair in a patient in need of same comprising administering to said patient an effective amount of the composition of claim 22.

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